

4. Discrete Function

Problem: Figure 1-5j shows a function that consists of a **discrete** set of points. Show that the function is one-to-one and thus is invertible, even though the function is increasing in some parts of the domain and decreasing in other parts.

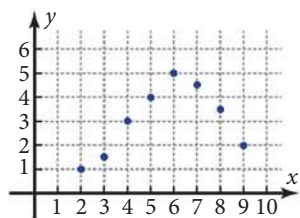
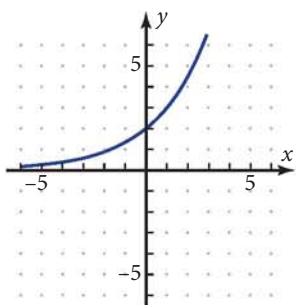


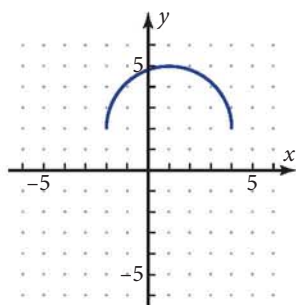
Figure 1-5j

For Problems 5–8, sketch the line $y = x$ and the inverse relation on a copy of the given figure. Be sure that the inverse relation is a reflection of the function graph across the line $y = x$. Tell whether the inverse relation is a function.

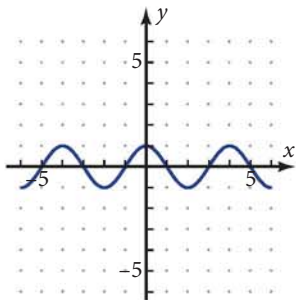
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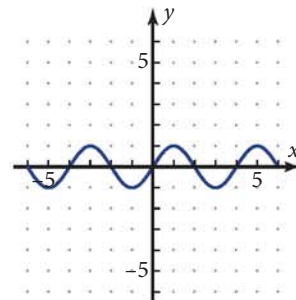
6.



7.



8.



For Problems 9–14,

- Plot the parametric equations on graph paper using the given domain for t . Connect the points with lines or smooth curves.
- Tell whether y is a function of x .
- Confirm your results by grapher, using the given domain for t .

9. $x = |t| - 3 \quad -5 \leq t \leq 5$
 $y = 2 - t$

10. $x = 5 - |t| \quad -7 \leq t \leq 4$
 $y = t + 1$

11. $x = 7 - t^2 \quad -3 \leq t \leq 4$
 $y = t + 2$

12. $x = t - 3 \quad -1 \leq t \leq 4$
 $y = (t - 2)^2$

13. $x = t + 3 \quad -1 \leq t \leq 3$
 $y = t^3 - 2t^2$

14. $x = t^2 - 2t + 2 \quad -1 \leq t \leq 2$
 $y = t^3 - t^2 + t + 1$

15. **Two Paths Problem:** Two particles (small objects) move along the paths shown in Figure 1-5k. The paths are given by these parametric equations, where x and y are distance in meters and t is time in seconds.

Particle 1: $x = t + 1 \quad y = 7 - t^2$ Particle 2: $x = 1.5t + 2 \quad y = 1.5t + 6$

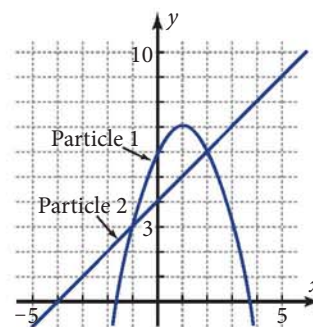


Figure 1-5k

- The paths intersect at two points. For each point, determine whether the particles reach that point at the same time or at different times. Give numbers to support your conclusion.
- Confirm your answer to part a graphically by plotting the two sets of parametric equations dynamically on the same screen, setting your grapher to simultaneous mode. Write a sentence or two explaining how your graph confirms your answer to part a.